

I claim:

1. A lens cell, comprising:

a) two transparent membranes, each of said membranes having an edge portion that extends around a periphery of said respective membrane, each of said edge portions having an exterior portion and an interior portion, with at least one of said membranes being flexible;

b) a ring located between said interior portions of said edge portions of said membranes, said ring extending around the peripheries of said membranes such that said membranes are spaced apart and form a cavity therebetween, said cavity being filled with a transparent fluid;

c) a frame having a channel therein, said membrane edge portions being located within said channel, said channel having a lip that is adjacent to said exterior portion of said flexible membrane edge portion, said lip having an inside surface that is spaced apart from an end surface of said ring so as to form a gap;

d) said edge portion of said flexible membrane being clamped within a portion of said gap between said lip inside surface and said ring end surface, wherein said edge portion of said flexible membrane pivots freely between said lip and said ring as said flexible membrane flexes due to changes in the fluid in said cavity.

2. The lens cell of claim 1, further comprising a seal that is interposed between said ring end surface and said interior portion of said edge portion of said flexible membrane.

3. The lens cell of claim 2, wherein said seal has a first projection that contacts said ring end surface.

4. The lens cell of claim 2, wherein said ring has a first projection that contacts said seal.

5. The lens cell of claim 1, further comprising a second projection that is interposed between said lip and said exterior portion of said flexible membrane edge portion, said second projection is coupled to said lip so as to form said lip inside surface.

6. The lens cell of claim 1, wherein said flexible membrane has a circular periphery.

7. The lens cell of claim 1, wherein said flexible membrane has a non-circular periphery.

8. The lens cell of claim 1, wherein both of said membranes are flexible, said ring being interposed between said respective interior portions of said edge portions of said membranes, said lip being a first lip, said channel having a second lip, with said edge portion of one said membranes being clamped between said ring and said first lip and said edge portion of said other membrane being clamped between said ring and said second lip.

9. The lens cell of claim 1, further comprising a port located in said ring, said port communicating with a reservoir for said fluid and also communicating with said cavity.

10. The lens cell of claim 9, wherein said reservoir comprises a piston located within a cylinder, said cylinder containing said reservoir of said fluid.

11. The lens cell of claim 10, further comprising a motor for moving said piston in and out of said cylinder.

12. The lens cell of claim 11 further comprising:

a) a first switch connected to said motor and for causing said motor to move said piston into said cylinder;

b) a second switch connected to said motor and for causing said motor to move said piston out of said cylinder.

13. The lens cell of claim 11 further comprising limit switches located at ends of a path traversed by the piston, said limit switches being connected to said motor so as to turn off said motor when said piston reaches the ends.

14. The lens cell of claim 9, wherein:

a) said reservoir comprises a flexible tube;

b) a roller is in contact with said tube, said roller and tube forming a peristaltic pump.

15. The lens cell of claim 9, further comprising a bias valve having an interior portion and an exterior portion, said interior portion communicating with said fluid in said reservoir and said exterior portion communicating with an exterior of said lens cell.

16. The lens cell of claim 9, wherein said reservoir comprises first and second channels, each of said first and second channels having first and second ends, said first end of each of said first and second channels being connected to said lens cell so as to allow communication between said first and second channels and said cell cavity, said second end of said first channel communicating with said second end of said second channel, said first channel having a first one way valve that allows said fluid to flow from said first channel first end to said first channel second end, said second channel having a second one-way valve that allows said fluid to flow from said second channel second end to said second channel first end.

17. The lens cell of claim 16, further comprising a bias valve having an interior portion and an exterior portion, said interior portion communicating with said fluid in said reservoir and said exterior portion communicating with an exterior of said lens cell, said interior portion communicating with said first channel.

18. The lens cells of claim 1 wherein said flexible membrane has a cross-sectional thickness profile between first and second surfaces, said first surface being parabolic.

19. The lens cell of claim 1 wherein said fluid is colored.

20. The lens cell of claim 1 wherein said fluid is a gas.

21. The lens cell of claim 1 wherein said other of said membranes is stiff and is a positive optical element.

22. The lens cell of claim 1 wherein said other of said membranes is stiff and is a negative optical element.

23. The lens cell of claim 1 wherein said other of said membranes is stiff and contains an astigmatic correction, said other of said membranes being rotatable and replaceable relative to said frame.

24. The lens cell of claim 1, further comprising:

a) said cavity having a port that communicates to a reservoir, said reservoir containing a portion of said fluid;

b) said reservoir having a piston head therein for moving said fluid in and out of said reservoir;

c) a hollow shaft having first and second ends, said first end of said shaft being coupled to said piston head and said second end of said shaft having a nut;

d) said nut receiving a rotatable screw, wherein when said screw rotates said hollow shaft and said piston head move relative to said reservoir so as to move said fluid in or out of said reservoir.

25. The lens cell of claim 1, further comprising:

a) said cavity having a port that communicates to a reservoir, said reservoir containing a portion of said fluid;

b) said reservoir having a piston head therein for moving said fluid in and out of said reservoir;

c) a rotatable hollow shaft having first and second ends, said first end of said shaft having a nut;

d) a screw having first and second ends, said screw first end being connected to said piston head, said screw being received by said nut and said hollow shaft,